

5 SUMMARY OF MITIGATION AND MONITORING MEASURES FOR THE OUTRIGGER TELESCOPES PROJECT

This Chapter summarizes the most important mitigation and monitoring measures for the Outrigger Telescopes Project. NASA is committed to ensuring implementation not only of the mitigations described in this Chapter, but also those presented elsewhere in this EIS.

The mitigation and monitoring activities for the Outrigger Telescopes Project, provided below, are detailed in Chapter 4 and Appendices B, D, E, and F of this Environmental Impact Statement (EIS). The National Historic Preservation Act (NHPA) Section 106 Memorandum of Agreement (MOA) in Appendix B describes the mitigation and monitoring measures associated with historical and cultural resources. The Consulting Parties invited under the Section 106 MOA include the Advisory Council on Historic Preservation (ACHP), the Hawai‘i State Historic Preservation Officer (SHPO), the University of Hawai‘i (UH), the California Association for Research in Astronomy (CARA), the California Institute of Technology (Caltech), Ahahui Ku Mauna, Hawai‘i Island Burial Council, Hui Mālama I Nā Kūpuna O Hawai‘i Nei, Mauna Kea Anaina Hou, the Office of Hawaiian Affairs (OHA), Office of Mauna Kea Management (OMKM), and the Royal Order of Kamehameha I.

Appendices D and E describe mitigation and monitoring measures associated with the Wēkiu bug and its habitat. CARA would ensure that any of the MOA’s provisions that relate to on-site construction and installation of the Outrigger Telescopes would be included as provisions in any contracts for on-site construction and installation (see Appendix F).

CARA would implement all of these mitigation measures, and NASA would ensure they are carried out during on-site

construction, installation, and operation of the Outrigger Telescopes.

5.1 HISTORIC/CULTURAL RESOURCE MITIGATION AND MONITORING MEASURES

In consultation with NASA and the other Consulting Parties, CARA shall develop criteria for and select an individual to be the project’s Cultural Monitor. Any Consulting Party may submit the names of persons who they believe would be appropriate to serve as Cultural Monitor. This individual will have the knowledge or awareness of Mauna Kea’s cultural landscape, and traditions, practices, beliefs, and customs associated with Mauna Kea.

- This individual will be able to communicate cultural values and protocols to others, both within and outside of the culture.
- The Cultural Monitor will become aware of the general scope and requirements of the on-site construction and installation of the Outrigger Telescopes Project including, but not limited to, becoming familiar with: project boundaries, identified areas of historic/cultural sensitivity, the “Construction Best Management Practices Plan” (BMP), the construction worker responsibilities, responsibilities of the Archaeologist, and the sequence of operations to ensure that mitigation actions are implemented.

- A Cultural Monitor will be provided free access for monitoring activities during excavation, other on-site construction, and telescope installation.
- Prior to construction, a cultural monitoring plan will be developed by the Cultural Monitor in consultation with CARA. CARA shall submit the plan for review by NASA and all other Consulting Parties.
- The CARA Construction Manager shall encourage the Cultural Monitor and Archaeologist to work closely with one another.
- The CARA Construction Manager will provide to the Cultural Monitor a weekly schedule of all construction activities planned for the following week. Based on that schedule, the Cultural Monitor will determine his/her need to visit the site during construction and installation as deemed necessary by him/her. For safety purposes, prior to entering the site, the Cultural Monitor will meet and confer with the CARA Construction Manager.
- The site and grading development drawings and the BMP for the Outrigger Telescopes project site, the staging areas, and nearby areas of the summit region will be provided to the Cultural Monitor. The Cultural Monitor shall keep a log and map notes of every visit — noting date of visit; identifying work locations; noting findings date; and reporting on potential problems, if any. All findings identified and deemed to be significant by the Cultural Monitor shall be reported to the CARA Construction Manager and OMKM; in turn, CARA shall promptly notify NASA, the

Advisory Council, the Hawai‘i SHPO, UH, and Caltech and any other Consulting Party that has requested to be notified of the Cultural Monitor’s findings. The Cultural Monitor will submit a final report to the CARA Construction Manager; CARA, in turn, will provide copies to NASA, the Council, the Hawai‘i SHPO, UH, OMKM, and Caltech and any other Consulting Party that has requested the report.

- The Cultural Monitor shall consult with the Construction Manager to determine what circumstances the Cultural Monitor should have direct authority to halt construction activities in a given area.
- The Cultural Monitor will provide cultural orientation to individuals who are associated with the on-site construction and installation of the Outrigger Telescopes and who will be on Mauna Kea. For safety purposes, all communication for the purpose of cultural orientation between project personnel and the Cultural Monitor will be scheduled and overseen by the CARA Construction Manager.
- The Archaeologist will be hired by CARA in consultation with the Hawai‘i SHPO and OMKM.
- The above monitoring plan (see I.B.2a) shall include burial and notification components that comply with Hawai‘i Revised Statutes (HRS) Title 6E-43.6 (Inadvertent Discovery of Burial Sites), and Hawai‘i Administrative Rules (HAR) Title 13-300-40 (Inadvertent Discovery of Human Remains) for the burial components; and with applicable draft State Historic Preservation Division (SHPD) Rules (e.g., Sections 13-275-12, 13-279-1 *et*

seq., and 13-280-1 *et seq.*) for the archaeological components. The burial treatment component will reflect that the preferred treatment, in the absence of evidence to the contrary, and to the extent practicable, is for any human burial found to remain in place.

- As a minimum, if there were to be an inadvertent discovery of human remains, or an archaeological property, the Archaeologist has the authority to halt ground-disturbing activities in the immediate area of such remains or archaeological property until all parties identified in the plan have been notified, and the requirements of the appropriately approved plan have been carried out.
- As a minimum, if previously unidentified historic properties (*e.g.*, deposits, artifacts, and stone alignments) were to be discovered during construction, the Archaeologist has the authority to halt ground disturbing activities in the immediate area of such properties until all parties identified in the plan have been notified, and the requirements of the appropriately approved plan have been carried out.
- The Archaeologist shall familiarize him/herself with the W.M. Keck Observatory site before construction begins.
- The Archaeologist will become aware of the general scope and requirements for the on-site construction of the Outrigger Telescopes Project. This would include, but not be limited to becoming familiar with: project boundaries, identified areas of historic/cultural sensitivity, the BMP, construction worker responsibilities, responsibilities of the Cultural

Monitor, and the sequence of operations to ensure that mitigation actions are implemented.

- The Archaeologist will monitor all excavation activities for on-site construction. The CARA Construction Manager will provide to the Archaeologist a weekly schedule of all construction activities planned for the following week. The Archaeologist will have access to the site and be present during all excavation activities. For safety purposes, prior to entering the site, the Archaeologist will meet and confer with the CARA Construction Manager.
- The site and grading development drawings and the BMP for the Outrigger Telescopes project site, the staging areas, and nearby areas of the summit region will be provided to the Archaeologist. The Archaeologist shall keep a log and map notes of every visit — noting date of visit; identifying work locations; noting findings date; and reporting potential problems, if any. All findings identified and deemed by the Archaeologist to be significant shall be reported to the CARA Construction Manager, the Hawai‘i SHPO, and OMKM; in turn, CARA shall promptly notify the NASA, the Council, UH, Caltech, and the Cultural Monitor of the Archaeologist’s findings. The Archaeologist will also notify the Cultural Monitor if a burial is involved so that he or she can assist in coordinating with lineal and cultural descendants and the Hawai‘i Island Burial Council. The Archaeologist will submit a draft report to the CARA Construction Manager; CARA, in turn, will forward the draft report to the Hawai‘i SHPO for approval. The

approved final report will be distributed by CARA, who will provide copies to NASA, the Council, UH, OMKM, and Caltech, and any other Consulting Party that has requested a copy of the report.

- Proposed grading and site development drawings will be provided to all the Consulting Parties for a 45-calendar day review and comment period to ensure that every reasonable effort has been made to reduce the adverse effects on Pu‘u Hau ‘Okī and on the summit region of Mauna Kea by minimizing disturbance from the on-site construction and installation of the Outrigger Telescopes. The goal of the grading and site development planning will be to minimize alteration of the cinder cone as it presently exists, maintain the general shape and form of the cinder cone as it presently exists, and to stabilize the cinder cone in the on-site construction and installation areas.
- When a Consulting Party provides comments to one of these plans, the party submitting the plan shall, to the extent practicable during a 45-day review period, enter into a dialogue with a commenter.
- The CARA Construction Manager will oversee the on-site professional personnel and all on-site construction and equipment installation. The CARA Construction Manager will schedule mutually agreed upon meetings with the Archaeologist, Cultural Monitor, and OMKM, to ensure that work is being carried out according to applicable terms of the MOA. The CARA Construction Manager, at the request of the Archaeologist or the Cultural Monitor or on his/her own initiative, has the

authority to stop construction if the stipulations in the MOA are not being complied with.

- As part of an orientation process to ensure work is carried out in as sensitive and respectful a manner as possible, the CARA Construction Manager, the contractor(s), foremen, and all construction workers involved in this Undertaking will be required to view a specially scripted training videotape reviewing the historic and sacred qualities of Mauna Kea.
- This training videotape will be prepared by CARA in consultation with the Hawai‘i SHPO and OMKM. This training videotape will include a presentation on the history of Mauna Kea and its significance to Native Hawaiians, and an overview of what to do if human remains or archaeological properties are found. CARA shall provide the Consulting Parties an opportunity early in the videotape development process to provide ideas on subject matter that should be discussed and highlighted. CARA shall afford the Consulting Parties an opportunity to review the draft script and preview the videotape before the videotape is produced in final form. Should a disagreement arise, CARA will enter into consultation to resolve the disagreements. The time for such consultations shall cumulatively not exceed 45 days, unless CARA, at its sole discretion, agrees to a longer cumulative period.
- The CARA Construction Manager, contractor (s), foremen, and construction workers will also be briefed by the Archaeologist and Cultural Monitor on Native Hawaiian objects, artifacts, and remains, and

what to do if such materials are found during construction activities.

- The videotape will also advise the workers of the potential loss of their jobs on this Undertaking if they fail to comply with the conditions imposed by the Construction Best Management Practices Plan.
- In order to implement a series of precautions and procedures to be undertaken to avoid or minimize adverse effects and prevent or reduce adverse impacts to the cinder cone and inner crater slope during on-site construction and installation, the CARA Construction Manager and the on-site construction and installation contractor(s) will prepare a Construction "Best Management Practices Plan" (BMP) in consultation and coordination with OMKM and UH. The BMP will be finalized prior to the start of construction. This BMP will reference the MOA and include it as an appendix.
- Prior to the start of construction, CARA will submit the draft BMP to the Signatories and the Concurring Parties for review. Copies of all comments received will be provided to NASA. CARA will take those comments into account before its final approval of the BMP and prior to mobilization. CARA will take no more than 15 calendar days to conclude consultation on any issues stemming from the comments.
- On-site construction and installation activities related to the Outrigger Telescopes — from delivery of materials and equipment to the W.M. Keck Observatory site or one of the two construction staging areas, excavation and removal of excess

cinder to the summit stockpile area through assembly of the domes and telescopes to clean up of the staging, stockpile and the W.M. Keck

Observatory site — will be managed in accordance with the BMP. The CARA Construction Manager will be responsible for following the BMP.

- To address the effects on historic properties, the BMP will include, but not necessarily be limited to, the following items:
 - The process to be followed if there were to be an inadvertent discovery of human remains or archaeological properties.
 - Site characterization, including the locations of all construction and laydown/stockpile areas on the site, and temporary on-site fill material stockpiles.
 - The sequence of construction activities will be designed to minimize potential adverse effects on historic properties and to allow efficient scheduling of appropriate monitoring times.
 - The specific methods needed to protect the attributes of the historic properties within the project site, staging areas, and within the immediate vicinity of the project area will include, but are not limited to:
 - Installing a temporary silt fence along the crater rim to facilitate on-site containment of all material, including cinder, so that no such material will spill over the slope. A silt fence will be used whenever excavation occurs within six feet of the slope.

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| <ul style="list-style-type: none"> ▪ Transferring all excavated material, to the extent not necessary for backfill or Wēkiu bug habitat restoration, to other locations accessible from the established roads on the summit of Mauna Kea. These locations will be identified after consultation with the Hawai‘i SHPO and OMKM prior to the start of construction. ▪ Following all applicable County of Hawai‘i and State Department of Health (DOH) regulations concerning dust control which include, but is not limited to, suspending all dust-generating activities, securing equipment and materials during high winds and storms, minimizing dust by spraying with water or other environmentally-acceptable soil stabilizers whenever necessary, and, if needed, covering excavated material with a tarp which is anchored down. ▪ Ensuring adherence to effective drainage and erosion control as provided for in the BMP. ▪ Ensuring that precautions are adopted to prevent potential adverse effects on the historic properties arising from use of the staging areas near the summit of Mauna Kea and at Hale Pōhaku. ▪ Providing an organizational chart that identifies project personnel with the responsibility for maintaining the integrity of the historic properties and the historic district. • To reduce the visual impact on the cinder cone and the historic district, all structures or portions thereof will be of | <p>colors designed to blend in with the surrounding terrain; provided, however, that such colors would not adversely affect the operation and scientific capability of the Outrigger Telescopes. CARA will afford the Consulting Parties an opportunity to review and comment on the colors to be used.</p> <ul style="list-style-type: none"> • Characteristics of any discharge of a pollutant into the environment associated with the construction activity (including solid waste, sanitary waste, oily waste, or toxic/hazardous waste, if any) will be identified as soon as it is practicable. Proposed control measures and/or treatment methods for any unplanned or accidental discharge of pollutants associated with construction activity will be developed by the contractor(s) and managed in accordance with the BMP. • During the construction and installation of the Outrigger Telescopes, OMKM, in consultation with the Hawai‘i SHPO, will develop and provide interpretative materials concerning the cultural significance of Mauna Kea. • CARA shall report work stoppage to NASA and all the Consulting Parties within two working days. • CARA shall make provisions for the Consulting Parties to monitor and review the work during on-site construction and installation activities. However, for safety purposes, all construction site visits must be coordinated through the CARA Construction Manager’s office. If it appears that the terms of this MOA are not being followed, Consulting Parties are encouraged to notify NASA, CARA, and the Hawai‘i SHPO. |
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NASA, in consultation with OMKM, will fund, out of funds for the Outrigger Telescopes Project, a \$2 million initiative that deals with preservation and protection of historic/cultural resources on Mauna Kea and educational needs of Hawaiians as a mitigation component of the Outrigger Telescopes Project. Funding such an initiative, however, is conditioned on the approval of the Outrigger Telescope's being placed at the W.M. Keck Observatory site on the summit of Mauna Kea, Hawai'i. This initiative will be sensitive to Native Hawaiian culture, history, and institutions.

- The necessary first step is the formation of local citizens' working group. NASA and OMKM, in consultation with the other Consulting Parties will ensure the formation of this working group. OMKM will coordinate and manage the activities of this working group and provide administrative services.
- Once this working group is formed, its task will be to inform NASA as to what types of opportunities or goals will best benefit Hawaiians, including Native Hawaiians. The working group will be asked to prioritize their proposals.
- Funding will be subject to the availability of appropriated funds in accordance with Federal law (*e.g.*, the Anti-Deficiency Act). Such funds will be allocated to the proposals as prioritized by the working group until available funds are exhausted.
- CARA will ensure that all persons involved with the operations of the Outrigger Telescopes shall be required, within a thirty day period of

commencing their job, to view as part of worker orientation the training videotape which addresses the cultural significance of Mauna Kea to Native Hawaiians. CARA will report to OMKM quarterly on the status of worker compliance with the viewing of the training videotape.

- In order to minimize negative effects, appropriate traffic control measures would be taken, and all trips of heavy oversized loads, such as those transporting the telescope components, would be scheduled during off-peak hours so as not to interfere with normal traffic flow in Hilo, Waimea, or along the Saddle Road.
- CARA shall ensure that the plans and mitigation measures set forth in the MOA for adverse effects on historic properties, including, visual impacts, erosion control, permit requirements and conditions, and monitoring commitments are incorporated into the contract(s) with its contractors and subcontractors.

5.2 WĒKIU BUG MITIGATION AND MONITORING MEASURES

- Wēkiu bug habitat will be restored in areas damaged by on-site Outrigger Telescope construction, and on the crater floor of Pu'u Hau 'Oki. Restored areas will total at least three times the total area damaged by new construction.
- Under no circumstances during construction, installation, and operation will cinder or other materials be deliberately side-cast into Wēkiu bug habitat. Temporary barriers will be built along the slope breaks above the inner slopes of Pu'u Hau 'Oki crater.

- Educational signs will be placed along the slope break above Wēkiu bug habitat, and at the service road adjacent to the crater floor.
- Potable water will be applied to excavation sites and cinder stockpiles as required to minimize dust during earthmoving activities.
- Only small or contained areas will be affected at any given time.
- Dust-generating activities will be suspended during high winds.
- Application of environmentally safe soil stabilizers may be applied to roads and parking areas to reduce dust during and after on-site construction. Environmentally safe soil stabilizers would only be used in situations where the application of potable water is inadequate for dust control. Soil-binding stabilizers will be used sparingly, and will never be applied to Wēkiu bug habitat. Soil stabilizers will be applied under light wind conditions to prevent cinder dust drift due to wind into Wēkiu bug habitat. Products considered for use will be reviewed by an entomologist familiar with Wēkiu bug ecology prior to being considered for use.
- The W.M. Keck Observatory staff will continue to follow Federal guidelines specifying the use and disposal of substances used in the washing and recoating of observatory mirrors.
- Contractors will be required to minimize the amount of on-site paints, thinners, and solvents. Painting and construction equipment will not be cleaned on-site. Contractors will be required to keep a log of hazardous materials brought on-site and report spills immediately to a designated

W.M. Keck Observatory representative.

- The amounts of such substances transported to the summit will be those required to support the current activity. The amount required for the entire project will not be stockpiled at the summit. Painting equipment would be cleaned off site to reduce the risk of a spill.
- Construction trash containers will be tightly covered to prevent construction wastes from being dispersed by wind.
- Construction materials stored at the site will be covered with tarps, or anchored in place, and not be susceptible to movement by wind.
- If construction materials and trash are blown into Wēkiu bug habitat, they will be collected to the extent practicable, with a minimum of disturbance to the habitat and cultural properties.
- Earthmoving equipment will be free of large deposits of soil, dirt, and vegetation debris that could harbor alien arthropods.
- Contractors will be required to pressure-wash earthmoving equipment to remove alien arthropods.
- Contractors will be required to inspect large trucks, tractors, and other heavy equipment before proceeding up the observatory access road.
- All construction materials, crates, shipping containers, packaging material, and observatory equipment will be free of alien arthropods when delivered to the summit.
- Contractors will be required to inspect shipping crates, containers, and

packing materials before shipment to Hawai‘i.

- Contractors will be required to inspect construction materials before transport to the summit area.
- Outdoor trash receptacles will be secured to the ground, have attached lids and plastic liners, and be collected frequently to reduce food availability for alien predators.
- New alien arthropod introductions (ants, yellow jackets, and spiders) detected during monitoring will be eradicated.
- Construction contracts will ensure that compliance violations are corrected.
- Cinder or ash will be moved to temporary stockpile areas and covered with tie-down tarps. Permanent placement of any excavated cinder fill and ash from the project area during on-site construction will be determined in consultation with SHPD and OMKM.
- Educational signs will be placed along the slope break above Wēkiu bug habitat, and at the service road adjacent to the crater floor. Attractive, non-intrusive, educational signs will be installed to inform people about the Wēkiu bugs, their habitat, and the historic/cultural significance of the area.
- Two types of Wēkiu bug monitoring will be implemented: (1) compliance monitoring to investigate the extent to which contractors, operators, managers, and visitors comply with Wēkiu bug protection guidelines and rules; and (2) effectiveness monitoring to investigate the changes in Wēkiu bug habitat and population that may

happen concurrent with and/or subsequent to construction of the Outrigger Telescopes.

- Strict adherence to precautions and procedures outlined in the construction Best Management Practices Plan (BMP’s) will be required to maintain slope stability.
- As part of project implementation, NASA will fund a study on Wēkiu bug autecology gather more information about habitat requirements, life cycle, nutritional requirements, and breeding behaviors.
- Contractors will properly maintain construction vehicles and equipment to minimize combustion emissions. Engine emissions would be controlled by the use of functional emission devices as required by law. Equipment idling would be kept to a minimum when not in use.

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